THE

RME 45

OPERATING and SERVICE MANUAL

RADIO MFG. ENGINEERS, INC.
PEORIA 6, ILLINOIS

INSTRUCTIONS FOR INSTALLATION AND OPERATION OF THE RME-45

The RME-45 is a 9 tube superheterodyne communication type receiver. This receiver incorporates several revolutionary features, notably the tuning arrangement which provides arbitrary calibration of 500 divisions on each range. The 45 is supplied complete with a variable selectivity type crystal filter and a calibrated carrier level meter.

INSTALLATION

Upon receipt of the receiver it should be carefully checked for any mechanical damage that may have resulted in transit. If any such damage is found a claim should be filed immediately with the carrier. No claims can be filed at the shipping point and the Radio Mfgs. Engineers, Inc. cannot be responsible for any damage incurred while in the hands of the carrier.

Before plugging the receiver into a power source the operator should be sure that it is of the proper voltage and frequency. A standard receiver is designed for operation on 115 volts 50/60 cycle current only. Attempted operation on any other voltage or frequency will result in damage to the receiver. A universal Model 45 may be obtained on special order. This model may be operated on either 115 or 230 volt and 25/60 cycle.

On the rear apron of the receiver (Fig. 2) is a small 5-prong socket for plugging in the speaker supplied with the set. THE RECEIVER SHOULD NEVER BE TURNED ON WITHOUT THE SPEAKER PLUGGED IN.

ANTENNA

The terminals on the rear apron (Fig. 2) marked "A-A-G" are for the antenna connection. When the receiver leaves the factory there is a jumper between one of the "A" posts and the "G" post. Good results may be obtained by connecting a wire 50 to 75 feet long to the other "A" post. If a 2 wire feeder system is used the jumper is removed and the two feeders are connected to "A" and "A".

RELAY AND BREAK-IN TERMINALS

On the rear apron are 2 sets of contacts marked "R" and "B" (See Fig. 2). The pair marked "B" are in series with the plate supply. This pair must always be shorted when the receiver is being used, either by a relay, as suggested in Fig. 3, or by a jumper if the remote control feature is not used. This jumper is in place when the set leaves the factory.

The pair marked "R" are relay control terminals. This pair is shorted when the receiver stand-by switch is turned to "Trans". It may be used to control an external relay in conjunction with a suitable external voltage.

OPERATION

Each control on the RME-45 receiver has a definite function and the operator should familiarize himself with their purpose and operation in order to obtain the best results.

The Cal-Q-Matic two speed tuning system is one of the important features of the RME-45.

The tuning mechanism uses a preloaded gear train which is entirely free from backlash. The smaller tuning knob rotates approximately five times while the larger one is turning once. This two speed tuning control enables the operator to cover a frequency band at the correct rate with the larger knob and to tune in a weak signal or one partially covered by other signals with the smaller one.

Elimination of the bandspread condenser lowers the losses in the RF circuit and therefor gives great gain and greater stability.

Five Amateur bands are directly calibrated on the bandspread dial, but the Cal-Q-Matic tuning system also includes an easy and accurate method of logging any frequency between 550 kc and 33,000 kc.

The inner half circle on the megacycle scale is divided into five sections, 0 through 4, and the inner circumference of the bandspread dial is marked off in 100 equal divisions. While the red pointer is covering one of the megacycle scale sections the bandspread dial makes one complete revolution. After a station has been heard it can be logged accurately by using the two sets of figures.

For example, if a station is heard on band 5 with the pointer in section 3 of the megacycle scale and with the bandspread dial at 28, that station is definitely logged at 328 because it will always be found at 328 on band 5. Or, if a station is logged at 173 on band 3, it is always tuned in on band 3 by turning the knob until the red pointer is in section 1 of the megacycle scale and until 73 comes up on the bandspread dial.

This method of logging enables the operator to return to a station very quickly and since there is no other dial to pre-set the station is always found at the same place.

In order to receive a frequency in one of the Amateur bands it is necessary only to set the band-change switch on the proper band and to tune the receiver until the red pointer is opposite the approximate frequency on the megacycle scale. The Amateur frequency may then be read directly from the calibrated bandspread dial.

The BAND SELECTOR SWITCH selects the frequency range desired. The range of the receiver is divided into 6 bands. The range covered by each band is as follows:

Band I	.540	to	1.6 MC	American Broadcast
Band II	1.6	to	2.9 MC	
Band III	2.9	to	5.4 MC	
Band IV	5.4	to	9.8 MC	
Band V	9.8	to	18.0 MC	
Band VI	18.0	to	33.0 MC	

Actually these figures do not represent the full range of each band since there is considerable overlap between the end of one band and the start of the next.

The LINE TONE control turns the receiver on and off. As the control is turned clockwise the line switch will close. Continued turning of the knob controls the audio response.

The STAND-BY SWITCH on the extreme right end of the control panel is used to make the receiver inoperative without turning off the line switch. When the control is in the center at "on" the receiver will operate, when it is turned to the right to "Standby" it will be dead. The third position labeled "Trans" also makes the receiver inoperative and, in addition, closes the relay circuit as mentioned previously.

The AUDIO GAIN Control to the left of the stand-by switch is used to adjust the audio volume to the desired level.

Below the control panel is a toggle switch labeled B.F.O. SWITCH which turns on the beat frequency oscillator. The beat frequency oscillator is indispensible in the reception of CW signals and is an aid in locating weak phone carriers. When the B.F.O. switch is thrown to ON, AVC (automatic volume control) is removed from the circuit. The gain of the receiver should be controlled with the RF gain control when CW signals are being received. Full automatic control of the receiver gain is obtained only when the B.F.O. switch is in the OFF position and when the R.F. gain control is in its maximum clockwise position. (See following paragraph on Carrier Level Meter).

The pitch of the beat frequency may be varied by means of the control labeled B.F.O. PITCH.

The CARRIER LEVEL meter is supplied with the Model 45. This meter indicates the average value of the carrier being received The meter is calibrated in db as well as in conventional numbers. As in previous RME models a signal difference of 1-R is equivalent to 6 db., and R-9 is equivalent to 100 microvolts input to the receiver. A phone signal should always be tuned so as to give a maximum reading on the meter. The meter should be adjusted to zero with the antenna disconnected by means of the screw on the rear of the chassis (See Fig. 2). It should be noted here that the accurate functioning of the CARRIER LEVEL meter depends on the setting of the R.F. GAIN control. The R. F. GAIN control should always be rotated to the maximum clockwise position and left there when it is desired to use the CARRIER LEVEL meter (this position is marked approximately by the designation AVC).

Below the control panel on the left is a jack marked "PHONES". Any pair of good headphones may be plugged into this jack for headphone reception. When the phones are plugged in the speaker is automatically cut out.

The CRYSTAL FILTER has two controls. The top control marked "XTAL SELECTIVITY" makes it possible to select the desired amount of selectivity for best results. Turning the control to OFF removes the crystal from the circuit. Rotating the control to the right changes the selectivity from a broad crystal characteristic at "1" suitable for phone reception to a razor-sharp characteristic at "5" for CW reception.

The CRYSTAL PHASING control should be adjusted to give minimum background noise. This setting will depend somewhat on particular conditions. This control may also be used to wipe out an interfering signal. Expert manipulation of the crystal filter usually comes only after a certain amount of practice.

An AUTOMATIC NOISE LIMITER is incorporated in the receiver circuits. No adjustment is required. The circuit is of a type that automatically adjusts itself to maximum effectiveness.

IMPORTANT

The action of the noise limiter is such that a slight amount of distortion is introduced on the signal. Therefore when it is desired to do so the noise limiter may be switched out of the circuit. This is accomplished by pulling "OUT" on the audio gain control. The shaft of this control floats and can be moved in and out with respect to the panel. When the knob is IN toward the panel the noise limiter is IN the circuit; when it is OUT from the panel the noise limiter is OUT of the circuit.

Voltage regulation of critical circuit potentials is provided by a VR-150 regulator tube. Fluctuations in line voltage and circuit voltages due to adjustment of certain receiver controls and the operation of the AVC circuits have a negligible effect on the tuned frequency of the receiver due to the stabilizing effects provided by this regulator.

Any question relative to the performance of the unit should be addressed to the Radio Mfg. Engineers, Inc. Peoria 6, Illinois, who will be very glad to cooperate in assisting in any type of difficulty.

The Radio Mfg. Engineers, Inc. reserve the right to make any changes in the instrument without obligating themselves with respect to prior production.

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Following these operating instructions will be found the Service notes on the RME-45 receiver.

RADIO MFG. ENGINEERS, INC. PEORIA 6, ILLINOIS

SERVICE NOTES FOR THE RME-45 RECEIVER

If the owner has available an accurate signal generator he may, by following the steps outlined in succeeding paragraphs, realign and recalibrate the receiver. If a signal generator is not available he may take the receiver to a reputable service man to have the work done. In addition to the signal generator an insulated screw driver will be required.

NOTE: The "R" meter makes an excellent resonance indicating device. All adjustments are made with the AVC on.

I. F. ALIGNMENT

The I.F. frequency of the RME-45 is 455 KC. The bandswitch should be turned to Band I. The tuning dial should be turned to the low frequency end (.55MC). The hot lead from the signal generator is clipped to the lug on the detector section (middle) of the tuning condenser. With the signal generator set to 455 KC. each padder on the 1st, 2nd and 3rd I.F. transformers (See Fig. 1) are carefully adjusted for maximum response as indicated on the meter.

NOTE: The frequency of the signal generator must be set accurately to that of the crystal. This is done in the following manner.

Turn the crystal selectivity switch to Position 5. Carefully adjust the signal generator frequency until the carrier meter rises sharply. The signal generator is now accurately on the crystal frequency. The crystal selectivity switch is turned to "OFF", and the three I.F. transformers are aligned as before.

BEAT OSCILLATOR ADJUSTMENT

With the signal generator connected as for aligning I.F. circuits, turn "B.O. SWITCH" on and set "B.O. PITCH" control pointer vertical. With an insulated screw driver adjust B.O. padder (See Fig. 1) until zero beat is obtained.

ALIGNMENT OF THE RADIO FREQUENCY SECTION

Alignment of the radio frequency section of the receiver will affect, principally, the calibration of the receiver. Within certain limits this, of course, will also affect the sensitivity. Small variations in frequency (up to 2%) will not materially reduce the sensitivity of the receiver, although they will of course show up as variations in the calibration as indicated by the setting of the MAIN TUNING DIAL. Correction of any variation of calibration can be made by following the suggestions outlined in the following paragraphs.

Band I includes frequencies between 540 and 1600 K.C. For Band I there are two frequency adjustments for adjusting the dial to the proper calibration. The adjustments are made on the top of the chassis through the dust cover over the Band I and II coils. The proper holes for making the adjustments are indicated on the top sketch on Fig. 3. There are 6 sets of large and small holes each. The two sets toward the rear of the chassis are the oscillator adjustments. The set toward the front are the RF stage adjustments; and the center set are for the detector. Under the large hole is a padder for adjusting the high frequency coil and adjusts the low frequency end.

The next step is to choose a station or a signal of accurately known frequency on the low frequency endof the range (for example 600 K.C.) and set the main tuning scale to read this frequency. If the station is not tuned in which the scale indicates its frequency it may be brought in by adjusting the oscillator coil core. This may be done with a small screw driver through the small hole marked "BAND I OSC." on Fig. 3. Another station or signal is now selected near the high frequency end of the range (for example 1400 K.C.) If this signal is not heard when the dial is accurately set to its frequency it may be brought in by adjusting the padder under the large hole marked "BAND I OSC." by means of an insulated trimmed tool. When this signal is accurately brought in as indicated by a maximum reading on the carrier meter one should go back to the low frequency test point and readjust it if it has changed. It may be necessary to go back and forth several times until both frequencies are accurately calibrated.

The procedure in calibrating and aligning BandII is the same for Band I. On this band two frequencies, such as 1800 and 2800 K.C. may be used.

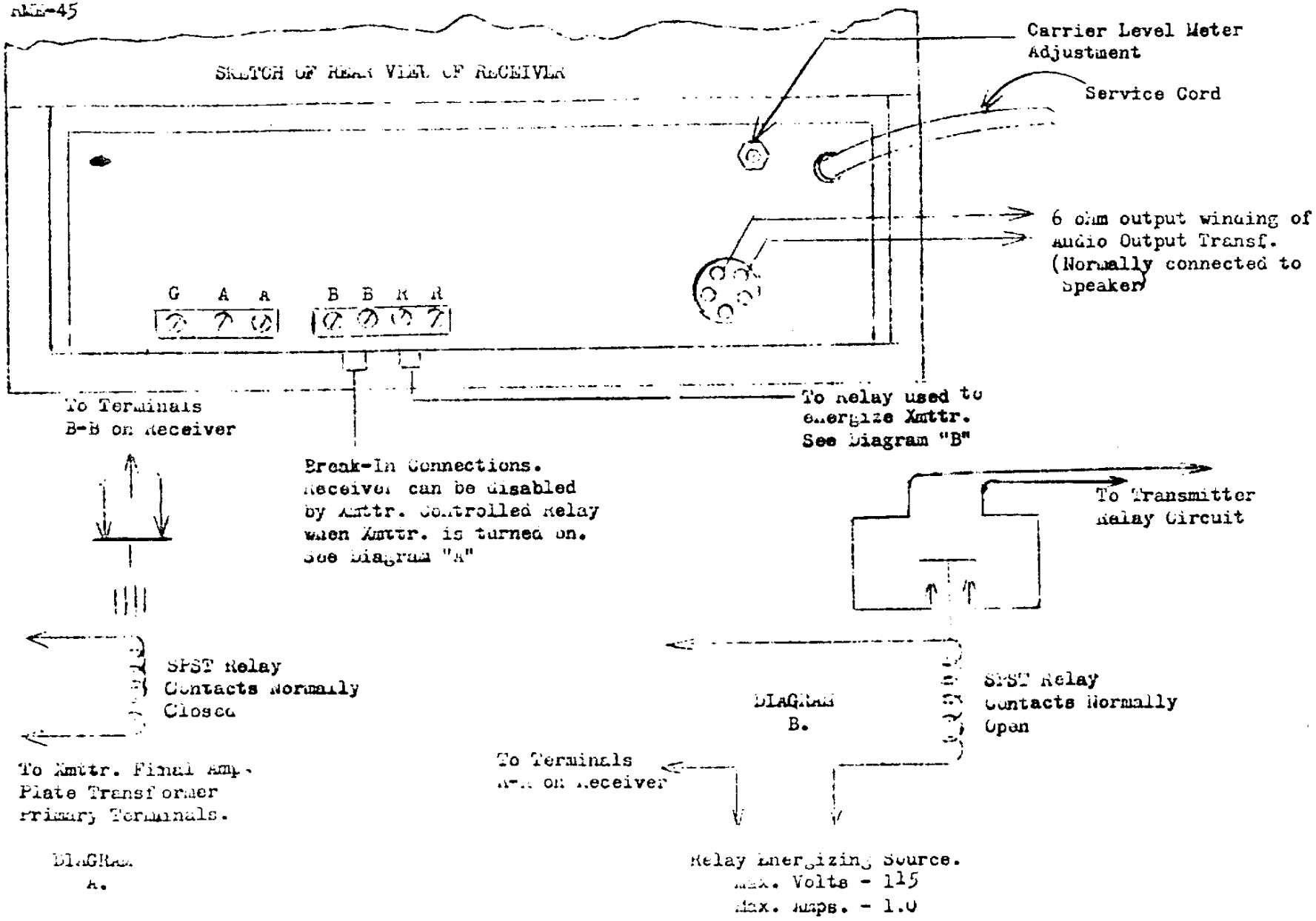
The four high frequency bands are calibrated and aligned by removing the bottom plate from the receiver. The screws holding the four rubber feet and the four small screws between them are removed. This allows the bottom plate to be removed. It will be found that an aluminum plate covers the coils. This plate has holes over the 12 padders and all adjustments should be made with this plate in position.

Since the inductance of the coils are accurately adjusted and set at the factory it is necessary only to calibrate one frequency on each band. The same applies to the alignment of the RF and detector padders. Suggested calibration points for each band are as follows:

Band III	5 M.C.
Band IV	9 M.C.
Band V	16 M.C.
Band VI	30 M.C.

From the bottom sketch on Fig. 3 on the location of each of the 3 padders for each band may be readily located. Note in particular the location of Band V and VI padders. Adjustments should be made with insulated screw driver type of trimmer tool.

AKR-45


SKETCH OF REAR VIEW OF RECEIVER
Carrier Level Meter Adjustment
Service Cord
6 ohm output winding of Audio Output Transf. (Normally connected to Speaker)
G A A B B R R
To Terminals B-B on Receiver
Break-In Connections. Receiver can be disabled by Xmttr. controlled Relay when Xmttr. is turned on. See Diagram "A"
To Relay used to energize Xmttr. See Diagram "B"
To Transmitter Relay Circuit
SPST Relay Contacts Normally Closed
To Xmttr. Final Amp. Plate Transformer Primary Terminals.
DIAGRAM A.
DIAGRAM B.
SPST Relay Contacts Normally Open
To Terminals A-A on Receiver
Relay Energizing Source.
Max. Volts - 115
Max. Amps. - 1.0

(The same voltage apply to the 2nd I.F. stage)

7C7 plate and ground	43 volts
7C7 screen and ground	112.5 volts
7C7 cathode and ground	3.1 volts
7C5 plate and ground	290 volts
7C5 screen and ground	305 volts
7C5 cathode and ground	13.5 volts
VR-150 plate to ground	150 volts
5Y3G rectifier filament and ground (B.O. turned On)	125 volts

These voltages are subject to a fluctuation of ±15% without indication of material difficulties

CONTINUITY CHECKS

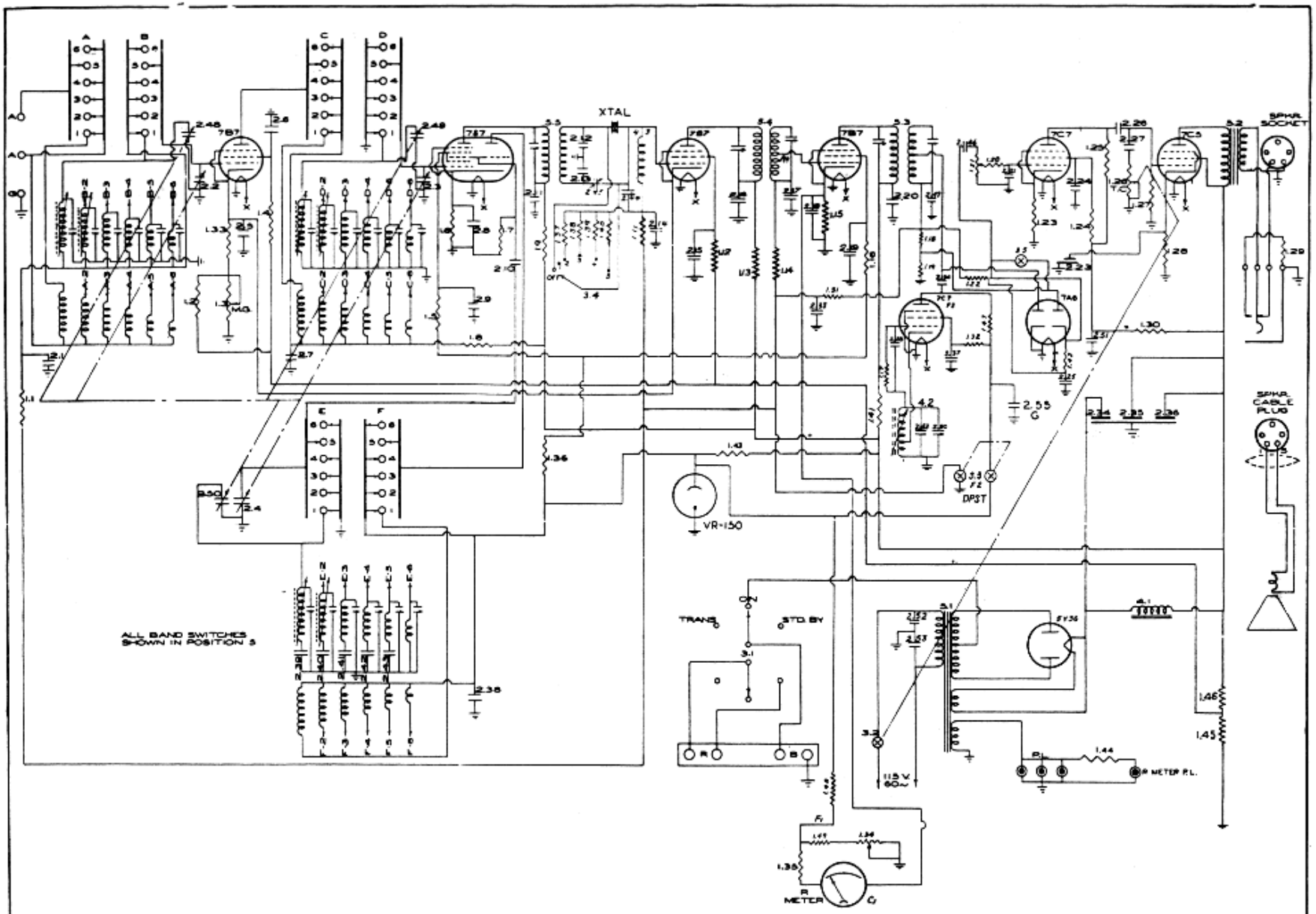
Receiver turned off. No jumper between "A" and "G" on antenna terminal strip,

PLACE TEST PROBS BETWEEN	RESISTANCE
A-1 and ground	Infinite
A-2 and ground	Infinite
"G" and ground	Short
RF amp., grid and ground	1 meg. ±20%
Converter grid and ground	Band 1 3.5 ohms
	Band 2 1.5 ohms
	Band 3 .3 ohms
	Band 4 .2 ohms
	Band 5 .1 ohms
	Band 6 .1 ohms
First I.F. Grid and ground	1 meg. ±20%
Second I.F. Grid and ground	1 meg. ±20%
Oscillator grid and ground	50,000 ohm ±20%
B. O. Grid and ground	100,000 ohm ±20%
7C7 Grid and ground	250,000 ohms to 0 ohm as audio gain control is rotated.
7C5 grid and ground	250,000 ohms 20%±
Oscillator section of tuning condenser and ground	Bands 1,2,3,4,5 Infinite
	Band 6 .1 ohm

SPECIFICATIONS

TUBES:	TYPE	USE
1.	7B7	R.F. Amplifier
2.	7S7	Converter
3.	7B7	1st I.F. Amplifier
4.	7B7	2nd I.F. Amplifier
5.	7C7	Beat Frequency Oscillator
6.	7A6	2nd Detector & Automatic Noise Limiter
7.	7C7	1st A.F. Amplifier
8.	7C5	Output Amplifier
9.	5Y3G	Rectifier
10.	VR-150	Regulator

I.F. Frequency: 455 Kilocycles
Power Consumption at 115 volts, 90 watts
Audio Output: 3 watts
Audio Frequency Response: 100 to 5,000 cycles per second ±2.5 db.
Cabinet Dimensions: Length 22-3/16 inches. Depth 12 inches, Height 11 inches.
Weight (unpacked): 44-1/4 pounds
Voice Coil Impedance: 6 ohms
When supplied with an Electro Dynamic Speaker Field Coil Resistance: 10,000 ohms
Tapped at: 4,500 ohms



SCHEMATIC
RME-45 RECEIVER

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RADIO MFG. ENGINEERS, Inc.
304 First Avenue PEORIA, ILL., U. S. A.

RME WARRANTY

Radio Mfg. Engineers, Inc. warrents each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to us or to our authorized radio dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

Radio Mfg. Engineers, Inc. 300-306 First Avenue Peoria, Illinois